



Mercury Risks - What Missouri Schools Can Do

Technical Bulletin

2/2006

The Missouri Department of Natural Resources along with Department of Health and Senior Services developed this bulletin to help schools reduce the risk of mercury exposure for students and staff. This information is intended to assist schools in avoiding mercury spills and explain the associated health threats and cleanup costs. In addition, this information will help schools conduct planning efforts to address mercury and mercury containing products, and in carrying out collection and disposal programs for mercury. School superintendents and principals, school board members, science departments, maintenance staff, home economics departments, parents and local health agencies may find this information useful.

Mercury

Mercury is a naturally occurring element found in trace amounts in many rocks and minerals, soils, water and the atmosphere. A few minerals, most notably cinnabar, contain high levels of mercury and have been mined since ancient Roman times. Mercury is the only heavy metal that is liquid at room temperature. In the elemental form, mercury will vaporize with increasing temperature. Other forms of mercury include mercury salts and methylmercury.

The amount of mercury found in the atmosphere, soil and water has increased during the last hundred years due to human activities. Each year in the United States, 150 tons of mercury is emitted into the atmosphere, of that amount, 50 tons is emitted by coal-fired power plants alone. Waste incineration, improper disposal of mercury products and other industrial processes also contribute to the mercury released into the environment.

After mercury is released into the atmosphere, rainfall and snowmelt carry it into lakes and other waterways. Once in the water, microscopic organisms convert elemental mercury into methylmercury. In this form, mercury enters the food chain and accumulates in the tissues of some fish. If humans or other animals eat mercury-contaminated fish, the body takes in the mercury. Once methylmercury has been ingested, it can permanently damage the brain, nervous system, kidneys and digestive system. Mercury in a mother's body passes to the fetus and can cause a variety of developmental problems including mental retardation, nervous disorders, blindness and seizures. It can also pass through breast milk to a nursing infant. Children under 12, pregnant and nursing women, and women who plan to become pregnant should avoid exposure to mercury.

Elemental mercury is used in many items found in schools such as thermometers, barometers, switches, thermostats, fluorescent lamps, bulk elemental mercury and laboratory reagents in science labs. Dangerous and costly mercury spills occur at schools from improperly storing and mishandling these items. Mercury readily volatilizes at room temperature and is easily inhaled. Indoor air may be contaminated by mercury vapor from a broken thermometer, other products, or improperly cleaned up spills. Improper clean up with a vacuum, paintbrush or household

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cleaner increases exposure by dispersing the mercury into the air. Short-term exposure to high levels of mercury vapors may cause serious health effects including lung damage, nausea, vomiting, diarrhea, as well as increases in blood pressure or heart rate, skin rashes and eye irritation. Symptoms from chronic or long-term exposure can develop in just a few weeks. Tremors, decreased eye-hand coordination, memory problems, insomnia and irritability can develop quickly. If these symptoms are not correctly identified and exposure is not prevented, then permanent nervous system damage can occur.

The Department of Natural Resources encourages schools to prevent spills by discontinuing the use of elemental mercury compounds and mercury-containing equipment, removing these materials from the school, and disposing of them in accordance with state and federal hazardous waste or universal waste regulations. Most items that contain mercury can be replaced with mercury-free (or lower-mercury) alternatives.

What Can School Officials Do Now?

1. The best advice is to keep mercury out of your schools. Avoid buying mercury products and devices. Choose mercury-free substitutes such as:
 - Alcohol or other spirit filled or digital thermometers,
 - Electronic thermostats and switches,
 - Aneroid blood pressure devices, and
 - Digital barometers and other gauges.
2. Understand that mercury is a toxic material that can be expensive to clean up if spilled. Find the mercury in your school by conducting an inventory. To do this, document the type and quantity of each mercury device, location and who manages each item. An example audit checklist has been attached. (appendix A)
3. Choose lower-mercury alternatives. There are currently no mercury-free fluorescent light bulbs manufactured, but low mercury bulbs are available. The department recommends that all fluorescent bulbs be recycled. For more information on proper disposal of fluorescent light bulbs, see the **About Disposal and Recycling** section located on page 4 of this document.
4. Budget for hazardous waste disposal of mercury and other unsafe chemicals in schools.
5. Dispose of unnecessary mercury chemical compounds and reagents, metallic mercury and mercury-containing products in accordance with state and federal hazardous waste or universal waste regulations.
6. Talk with teachers, school employees, parents, students and community officials about your plans for mercury education, reduction and elimination.

Eliminating mercury releases from improper disposal of broken thermometers, some paints, batteries, fluorescent light bulbs and other mercury containing items is important. It takes an effort from everyone to manage mercury wastes properly. Contact the department's Hazardous Waste Program at (573) 751-7560 if you have questions about the content of this bulletin or other questions about mercury.

Cleaning Up Small Spills

A small spill can be compared to the amount of mercury found in a typical fever or school science lab thermometer. Metallic mercury is liquid at room temperature and has no odor. When spilled, some of the metal will evaporate into the air and can be carried long distances. Mercury is toxic when inhaled, you must be careful when handling and disposing of all items in the school

that contain metallic mercury. If you break a thermometer, do not panic. The amount of mercury contained in a fever thermometer is small and does not present an immediate threat to human health. However, if it is not properly cleaned up and disposed of, it may present a health risk over time, particularly to children less than 12 years old, pregnant women, women who plan to become pregnant and nursing mothers.

If small amounts of mercury are spilled in a room:

1. Evacuate the spill area. Leave all shoes, clothing and other articles that were splashed with mercury at the spill site.
2. Wash skin exposed to mercury with soap and water.
3. Turn off heating/air conditioning to prevent mercury vapors from being spread throughout the building.
4. Isolate the spill site by closing interior doors.
5. Ventilate the spill area to the outdoors by opening outside windows for passive ventilation. If a window fan is available, use it as an exhaust fan to provide active ventilation to the outdoors.
6. Assemble cleanup supplies. If a mercury spill kit is not readily available, use the following items:
 - Rubber, nitrile or vinyl gloves,
 - Safety glasses,
 - Eye dropper or syringe without a needle,
 - Playing cards,
 - Rubber squeegee,
 - Duct tape or other heavy duty tape,
 - Plastic container with lid or heavy duty ziplock bags and
 - Flashlight.

NEVER USE A VACUUM CLEANER OR BROOM TO CLEAN UP A MERCURY SPILL. A vacuum cleaner will vaporize mercury and disperse it to the air, creating a worse hazard. A broom will break mercury into smaller beads, making it more difficult to clean up.

7. Dress appropriately. Remove jewelry from hands and wrists so the mercury does not combine (amalgamate) with other metals. Put on protective gloves and safety glasses. Wear old clothes that can be discarded if they become contaminated.
8. Inspect the spill site with a bright flashlight. The mercury beads shine like mirrors.
9. Pick up the mercury drops using one or more techniques:
 - If a commercial mercury spill kit is available, follow the manufacturer's instructions to clean up the mercury. If a spill kit is not available:
 - Carefully use a squeegee or playing cards to combine the beads and concentrate the spill into as small an area as practical. **Be very careful – mercury beads roll easily on a hard surface.**

10. Use an eyedropper or syringe to suck up the beads. Put the beads in a plastic container, zip lock bag, 35-mm film canister or other appropriate small container. You can also use the sticky side of duct tape to grab the beads. Put the tape and beads into a zip lock bag or other appropriate container. Once all the visible mercury beads have been picked up, re-inspect the area with a flashlight to look for more beads that may have migrated to any cracks, baseboards, etc. Continue cleaning up until all visible mercury has been removed.
11. Double bag all mercury-contaminated materials using heavy-duty ziplock bags or plastic containers with an airtight lid.
12. If carpet has been contaminated, it may be necessary to remove it for disposal, depending upon the amount of mercury spilled.

DO NOT DUMP MERCURY DOWN THE DRAIN OR INTO THE TRASH. Call the department's Environmental Emergency Response 24-hour hotline at **(573) 634-2436** for technical assistance with any cleanup or disposal questions. On-scene cleanup and air monitoring assistance may be provided for larger mercury spills. The department may also be able to provide direct assistance with disposal of elemental mercury. Do not hesitate to call the hotline with questions about mercury spills.

13. Continue to ventilate the spill area to the outdoors for at least 24 hours after the cleanup has been completed.

For larger mercury spills, follow the preliminary evacuation and isolation steps 1 through 5 listed above. The law requires you to report any mercury spill greater than one pound, which is equal to the amount contained in about two tablespoons. To report a mercury spill, call the department's hotline at (573) 634-2436.

About Disposal and Recycling

It is legal for households to dispose of unwanted devices that contain mercury in their trash destined for a sanitary landfill. Double-bagging is recommended to help limit human exposure during handling. Such items include thermometers, thermostats, barometers, manometers and mercury-containing lamps. However, businesses are required to manage these types of wastes either as universal or hazardous waste and sanitary landfill disposal is not an option. The mercury-containing items listed above may be managed as universal wastes, which are a subcategory of hazardous waste with streamlined management requirements. For more information about universal waste, see the department's technical bulletin *The Universal Waste Rule in Missouri* at www.dnr.mo.gov/pubs/pub2058.pdf.

Unwanted laboratory chemicals, including jars of elemental mercury, must be managed as hazardous waste and universal waste handling is not an option. Hazardous waste must be packaged, marked and labeled, transported and disposed of according to applicable state regulations. For more information about managing hazardous waste, see the department's fact sheet *Does Your Business Generate Hazardous Waste?* at www.dnr.mo.gov/pubs/pub117.pdf

The department has prepared a reference manual *Hazardous Waste Management Handbook for Small-Quantity Generators* to help small-quantity generators of hazardous wastes comply with federal and state laws pertaining to proper hazardous waste management procedures. This manual is specifically designed for those generators who produce between 220 and 2,200 pounds of hazardous waste monthly, or accumulate such amounts. It is available on the department's Web site at www.dnr.mo.gov/pubs/pub128.pdf

Or if you generate less than regulated quantities, see the department's fact sheet *Management of Conditionally Exempt Small Quantities of Hazardous Wastes* at www.dnr.mo.gov/pubs/pub128.pdf.

Fluorescent lamps may be recycled. For a list of recycling locations, see the department's fact sheet *Fluorescent Bulb Recyclers* at www.dnr.mo.gov/pubs/pub451.pdf.

For more details on waste fluorescent lamps, refer to the department's *Fluorescent Lamps* technical bulletin at www.dnr.mo.gov/pubs/pub24.pdf.

For Missouri hazardous waste disposal facilities that you may contact for price quotes, see the list of Missouri Commercial Hazardous Waste Facilities on the department's Web site at www.dnr.mo.gov/pubs/pub968.pdf.

Web Sites for Additional Mercury Information

Mercury: In Your Community and The Environment

<http://www.epa.gov/glnpo/bnsdocs/merccomm/merccomm.pdf>

- Helps your students learn about the health and environmental concerns associated with mercury, where it is in their school and homes, and helps school officials and family members do something about it.
- Contains teacher and student activity materials.

State Mercury Schools Programs

<http://www.epa.gov/epaoswer/hazwaste/mercury/school.htm>

- Describes state-sponsored programs to help remove mercury-containing materials in schools.

Schools Chemical Cleanout Campaign (SC3)

<http://www.epa.gov/epaoswer/osw/conserv/clusters/schools/index.htm>

- Provides information about how to remove potentially harmful chemicals from schools.
- Emphasizes the implementation of preventive programs such as chemical management training for lab instructors.
- Raises national awareness of the issue of chemicals in schools.

Agency for Toxic Substances and Disease Registry Metallic Mercury Exposure Alert

<http://www.atsdr.cdc.gov/alerts/970626.html>

- National Alert about metallic mercury in schools and ritual mercury use.

Getting Mercury Out of Schools and Communities

<http://www.newmoa.org/prevention/mercury/schools/>

- Outreach and assistance materials to assist communities in identifying and removing elemental mercury and products containing mercury from schools and from homes.

Mercury in Schools

<http://www.mercuryinschools.uwex.edu/>

- Provides a clearinghouse for information relating to reducing mercury usage.
- Increasing mercury recycling and improving mercury management in schools.
- Educating students and teachers about eliminating mercury.
- Conducting workshops for educators and agency staff.

Mercury in Necklaces and Jewelry

<http://www.doh.wa.gov/ehp/ts/IAQ/MercuryNecklaces.html>

- Information about necklaces with mercury from Mexico that are popular with children
- Pictures of necklaces are shown.
- Many states have issued health alerts about these necklaces and the risks that they pose to children and schools.

For more information call or write:

Missouri Department of Natural Resources

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1-800-361-4827

www.dnr.mo.gov